WHAT IS CLAIMED IS:

1. A software-based method for simulation of multiple access networks comprising:

a data conversion procedure for converting network configuration information into a data type that is identifiable by a computer and storing the same in a rewritable data storage device which is capable of distributing data into respective computers;

a computer-played simulator procedure for retrieving contents of the rewritable data storage device and following a logic operation based on the contents, so as to act as a simulator for simulating nodes in the network;

a first validation procedure for validating an integrity of the network configuration;

a second validation procedure for validating a symmetry of the network configuration;

a transmitting simulation frame procedure for transmitting simulation frames to a receiving simulator, wherein the simulation frame is implemented as a data structure capable of communicating among nodes;

a receiving simulation frame procedure for determining whether the received simulation frames are valid or not; and

a software simulation network configuration procedure for establishing a network configuration to be simulated based on above procedures.

2. The method as claimed in claim 1, wherein the rewritable data

storage device comprises:

at least one node in the network;

at least one link implemented as transferring media for transferring the simulation frames; and

at least one network interface allowed to couple to at most one link and belong to at most one node.

3. The method as claimed in claim 2, wherein the data conversion procedure comprises:

(A) defining a simulation by a user;

(B) analyzing a configuration relationship among the nodes, the links, and the network interfaces;

(C) using mathematical sets to represent the nodes, the links, and the network interfaces so as to form a data type identifiable by the computer; and

(D) storing the data type in the rewritable data storage device.

4. The method as claimed in claim 2, wherein in the first validation procedure, if R, L, N, I and S represent the rewritable data storage device, all links represented by R, all nodes represented by R, all network interfaces represented by R, and all simulators executed by R, respectively, and data of the rewritable data storage device is distributed into k computers and represented as R_1, R_2, R_3,..., and R_k, wherein $R_1=\{L_1, N_1, I_1, S_1\}$, $R_2=\{L_2, N_2, I_2, S_2\}$,...,$R_k=\{L_k, N_k, I_k, S_k\}$, the first validation procedure comprises the steps of:

(A) letting $L=L_1 \cup L_2 \cup L_3 \ldots \cup L_k$, $N=N_1 \cup N_2 \cup N_3 \ldots \cup N_k$, and $I=I_1 \cup I_2 \cup I_3 \ldots \cup I_k$; and

(B) validating whether any two links L_x and L_y in the rewritable data storage device satisfy an expression $(L_x \cap L_y) = \emptyset$, and validating whether any two nodes N_x and N_y therein satisfy an expression $(N_x \cap N_y) = \emptyset$.

5. The method as claimed in claim 2, wherein in the second validation procedure, if R, L, N, I and S represent the rewritable data storage device, all links represented by R, all nodes represented by R, all network interfaces represented by R, and all simulators executed by R, respectively, and k simulators represented as S_1, S_2, S_3,..., and S_k are defined to participate a simulation, the second validation procedure comprises the steps of:

(A) defining nodes to be simulated by a simulator as $N(S_i)$ where i=1, 2, 3,...,k; and

(B) assuming $N(S_i)=\{N_1, N_2, N_3,...,N_m\}$, defining $L(N_j)$ as a set of all links coupled to the node where j=1,2,3,...,m, and defining $L(S_i)$ as a set of all links related to the simulator; and

(C) defining any two simulators S_x and S_y to be symmetric if they satisfy $L(S_x) \cap L(S_y) \neq \emptyset$, and each of the simulators S_x and S_y obtaining complete information of the other by the rewritable data storage device.

6. The method as claimed in claim 2, wherein the simulation frame has fields for storing an address of its network interface, an address of the network interface to be transmitted, and link information used between any two network interfaces.

7. The method as claimed in claim 6, wherein the transmitting simulation frame procedure comprises the steps of:

(A) calling a protocol; and

(B) using a transmitting function of the protocol to transmit the simulation frame to a simulator conforming to the simulation.

8. The method as claimed in claim 2, wherein the receiving simulation frame procedure comprises:

(A) receiving the simulation frame;

(B) retrieving the address of the network interface to be transmitted from the simulation frame and link information used between any two network interfaces;

(C) comparing the network interface or link information stored in the simulation frame with that in the simulator; and

(D) accepting the simulation frame by the simulator if comparison in (C) is matched.

9. The method as claimed in claim 2, wherein the software simulation network configuration procedure comprises the steps of:

(A) programming the network configuration to be simulated;

(B) converting the programmed network configuration to be simulated into the data type identifiable by the computer by performing the data conversion procedure;

(C) determining number of the simulators and number of nodes to be simulated by the simulators;

(D) dividing and distributing the configuration data in rewritable data storage device into each of simulators for being stored; and

(E) ascertaining that each simulator is capable of transmitting and receiving the simulation frames, and capable of recognizing structure

information of the other one.